

MEADIA ROSENI, A NEW SYNAPHOBRANCHID EEL
FROM THE COAST OF TAIWAN
(ANGUILLIOIDEA: SYNAPHOBRANCHIDAE)

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ABSTRACT

A new species of synphobranchid eel, *Meadia roseni*, was caught off the southern coast of Taiwan (22°21'05"N, 120°12'46"E) in depth of 1,020 m. It is characterized by a long lateral line (87.5% of standard length), well-developed rostral papillae and ridges, numerous vertebrae (200), forward location of anus ($\frac{3}{5}$ head length posterior to gill slits), long gill slits (13.3% of head length), and short snout (25.7% of head length). It differs greatly from *M. abyssalis*, the only species previously assigned to this genus.

Fish from deeper waters along the east and southern coasts of Taiwan have not received proper attention by the Taiwanese ichthyologists. To enrich our knowledge of the fishes from these waters, a cruise was arranged for 7-9 February 1988, using fish traps to collect specimens from depths around 400 to 1,000 m. The dominant fishes collected by such method operated during the cruise were Myxiniids. Besides this group, two anguilliformes fishes and two macrourids were also collected; all turned out to be new records. Examination of one of the two anguilliformes specimens has shown that it belongs to the subfamily Ilyophinae of the Synphobranchidae, while the other specimen was identified as *Synphobranchus affinis* Gunther. According to Masuda et al. (1984), Synphobranchidae and Dysommataidae were considered separate families, and only two dysommataid species *Dysomma anguillare* Barnard and *Meadia abyssalis* Kamohara have been reported from the Japanese Archipelago region. Chen and Weng (1967) reported two dysommataid species from Taiwan waters, *D. anguillare* Barnard and *D. melanurum* Chen and Weng. Characteristics of this particular dysommataid specimen collected by us exhibit numerous features of the genus *Meadia*. However, it does not fully agree with the diagnosis of the species *M. abyssalis*, the only species assigned to this genus.

The purpose of the present paper is to describe the new species of *Meadia* represented by this unique adult specimen.

MATERIALS AND METHODS

Field collection was made on the R/V HAI FU owned by the Taiwan Fishery Research Institute. Collecting gear was a 70 cm × 40 cm × 35 cm shrimp trap. The specimen was frozen soon after caught. Photographs were taken on shore before the specimen was fixed by 10% formalin and preserved permanently with 40% isopropanol. Measurements were made by vernier calipers according to Saldanha and Merrett (1982). X-ray photographs were taken for counting vertebrae number.

Meadia roseni new species

Holotype. — 745 mm; Institute of Marine Biology, National Sun Yat-sen University, register number NSYU 2582. Locality: 22°21'05"N, 120°12'46"E. Depth of bottom trap: 1,020 m. Date: 9 February 1988. Only this specimen was caught in this particular trap.

Diagnosis. — Scaleless. Gape of mouth to two eye-diameter behind posterior margin of eye. Gill slits ventrolateral, separated. Anus far forward. Teeth conical, no

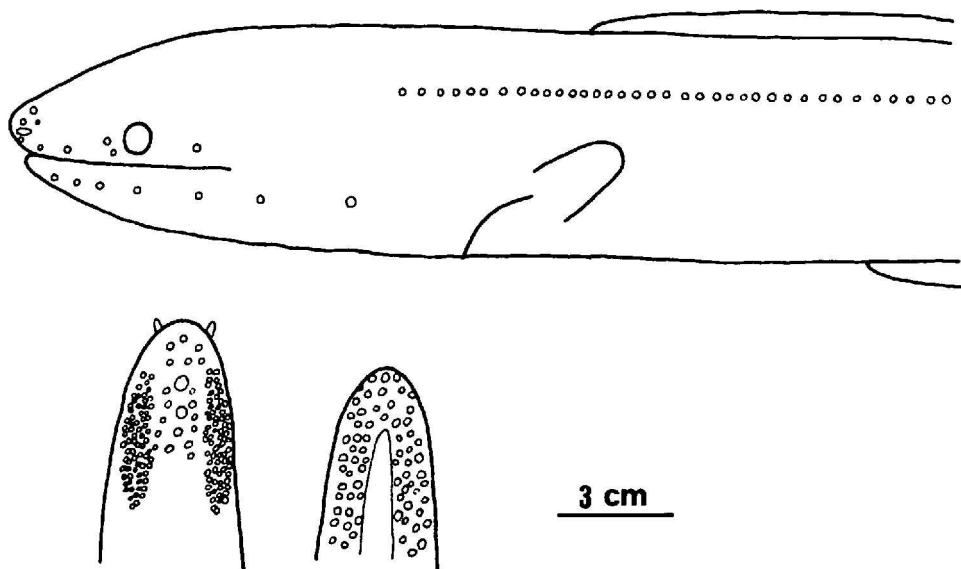


Figure 1. *Meadia roseni*. Above: lateral view of holotype NSYU 2582 showing its head profile, lateralis system, gill slit, pectoral fin, and dorsal origin. Lower left: dentition of upper jaw. Lower right: dentition of lower jaw.

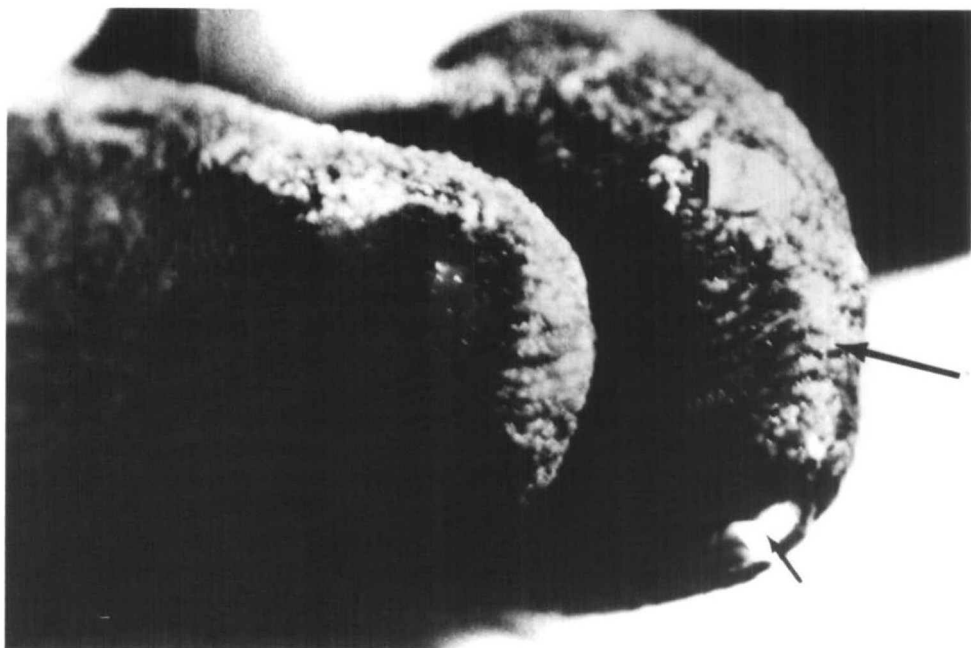


Figure 2. *Meadia roseni*. Photograph of frontal view of holotype NSYU 2582 showing the ornamentation of its jaw tips. Long arrow points at one of the plicae on the upper jaw. The left anterior nostril is indicated by the short arrow.



Figure 3. *Meadia roseni*. Photograph of lateral view of holotype NSYU 2582 showing the well-developed papillose condition.

compound teeth on vomer. Body color dark brown. Lateral line long, extending nearly to caudal base. Five, 3, and 7 pores present on infraorbital, supraorbital, and pre-operculomandibular canal respectively (Fig. 1). Rostral ornamentation of papillae and plicae (Figs. 2, 3) and oral papillae well-developed. Vertebrae number 200.

Description. — Body elongate, laterally compressed and tapering gradually towards the caudal base. Body depth contained 14.9 in total length. Preanal and predorsal lengths contained 4.5 and 6.2 in total length respectively. Head length contained 6.5 in total length. Measurements in head length of snout length, jaw length, diameter of the eye, branchial aperture, interorbital width and pectoral-fin length are 3.9, 2.1, 12.8, 7.5, 6.4, and 4.1 respectively. Distance between anus and posterior tip of gill slit is $\frac{3}{5}$ of head length. Proportions of various body parts are summarized in Table 1. Gill slit obliquely located on lateroventral side of the body, and anteroventrally to the base of pectoral fin (Fig. 1).

Head. — Head profile convex moderately behind the eye. Head laterally compressed and frontally blunt. Lower jaw slightly subterminal. Tips of both jaws ridged with plicae (Fig. 2). Papillae extend to dorsal side of snout and to ventral side of lower jaw. Papillae laterally spread to posterior end of mouth cleft (Fig. 3). Anterior nostrils are long white tubes; posterior nostrils with slightly raised rim, located close to anterior edge of eye at about the level of anterior nostrils. Eye large, covered by skin. Gill slit oblique, located on the lateroventral side of the body.

Dentition. — Six conical teeth on premaxillary-ethmoid complex, these teeth merely exceed foremost teeth of lower jaw. Vomerine teeth triserial of which middle series has four large conical teeth. By both sides of this middle row are two lateral

Table 1. Measurement of body parts of *M. roseni* expressed as percent of total or head (*) length

Body measurement	Percent of total or head (*) length
Standard length	98.3
Head length	15.4
Body depth (gill-slit level)	6.7
Prepectoral length	14.8
Predorsal length	16.2
Preanal length	22.3
Preanal fin length	23.5
Trunk length*	54.0
Snout length*	25.7
Gape length*	47.8
Eye diameter*	7.8
Postorbital length*	10.1
Gill-slit length*	13.3
Pectoral fin length*	24.3
Interorbital width*	15.7

rows of 5 or 6 smaller teeth; none of vomerine teeth compound. Maxillary teeth numerous and small, arranged irregularly but closely into compact band. Conical teeth about size of teeth on lateral vomerine-teeth rows, distributed evenly in the lower jaw (Fig. 1). Bases of all teeth immersed in yellowish papillose tissue. Tongue toothless and not free.

Lateralis System. — Length of lateral line on body reaches about 87.5% of standard length. All trunk sensory pores evenly spaced, with 9th pore right above anterior pectoral fin base (Fig. 1). Sensory pores rimmed by white raised tube. Distribution of cephalic sensory pores illustrated in Figure 1.

Fins. — Origin of dorsal fin posterior to pectoral-fin base (Fig. 1), distance between these two points about $\frac{3}{5}$ of pectoral fin length. Dorsal fin low, contained 7.7 in body depth. Anal fin more prominent than dorsal, contained 3.2 in body depth. Anal fin originates behind anus by short distance, i.e., one eye-diameter posterior to anus. Pectoral fin broad-based, oval, ca. three times of eye-diameter. Pectoral-fin ray 16. Caudal fin well-developed, continuous with dorsal and anal fin.

Coloration. — In life dark brown. Color faded to light brown after preserved in formalin. Anterior part of dorsal fin is light and darkens posteriorly. Coloration in anal and caudal fins darker brown than dorsal fin.

Etymology. — We name this new species after Dr. Donn Eric Rosen, the late ichthyologist of the American Museum of Natural History, as a memory to his tremendous contribution to fish systematics.

DISCUSSION

Robins and Robins (1989) classified the Synphobranchidae into three subfamilies (i.e., Synphobranchinae, Ilyophinae (=Dysommatainae), and Simenchelyiinae) and distinguished the Synphobranchinae from Ilyophinae by coloration, lateralis system (length of lateral line on body and number of cephalic pores), development of oral papillae and rostral papillae and ridges, dentition, position of anal fin, squamation, shape of head, and pigmentation of larvae. Conditions of the first six characters of the present specimen (lateralis system refers to the number of cephalic pores) verify its status in the Ilyophinae. Characters of external morphology of the ilyophine genera are listed in Table 2 (also see Robins and

Table 2. External morphology of *Meadia roseni* and existing ilyophine genera [data of genera taken mainly from Robins and Robins (1970; 1976)]

	<i>Meadia</i>	<i>M. roseni</i>	<i>Dysommia</i>	<i>Dysommia</i>	<i>Atractodenchelys</i>	<i>Ilyophis</i>
Dorsal origin	above basal third of pectoral fin	slightly before tip of pectoral fin	in advance of pectoral-fin base to posterior to level of gill slit by one-half head length	above the posterior half of pectoral fin	above the posterior half of pectoral fin	over or posterior to tip of pectoral fin by more than one eye-diameter
Squamation	naked	naked	naked	naked	naked	naked or scaled
Trunk length	shorter than head length	shorter than head length	shorter than head length	about one head length	slightly more than head length	one-and-one-fifth to two head-length
Lateral line pore	on anterior third of body	nearly to caudal base	absent to nearly complete	?	on nearly entire body	on anterior half of body or nearly entire body
Orientation of gill slit	oblique	oblique	oblique	oblique	vertical	horizontal
Teeth	not compound; vomerine teeth not set in pad of papillose epithelium	not compound; vomerine teeth not set in pad of papillose epithelium	compound; vomerine teeth set in pad of papillose epithelium	compound; vomerine teeth set in pad of papillose epithelium	compound	not compound
Vertebrae number	165-170	200	mostly 107-137 (<i>D. brevirostre</i> 190-205)	126-138	168-173	mostly 131-158 (<i>I. balchei</i> 179-188)

Table 3. Comparison of morphological characters between *Meadia abyssalis* and *M. roseni* [characters of *M. abyssalis* taken from Robins and Robins (1976)]

	<i>M. abyssalis</i>	<i>M. roseni</i>
Squamation	naked	naked
Branchial aperture	low on body; just ventral and anterior to base of pectoral fin; 6.0–7.6% of head length	obliquely located on lateroventral side of the body; anterior and ventral to base of pectoral fin; 13.3% of head length
Eye	large, covered by skin, not deeply subcutaneous	same as <i>M. abyssalis</i>
Jaw	fleshy tip of snout overhanging tip of lower jaw slightly; snout flattened dorsally, 30–33% of head length; tips of both jaws plicate, their fleshy margin papillose	fleshy tip of snout overhanging tip of lower jaw slightly; snout curved moderately, 25.7% of head length; tip of both jaws plicate; their fleshy margin bear numerous papillae
Gape length	gape of mouth only to posterior margin of eye	gape of mouth to two eye-diameter behind posterior margin of eye
Lateralis system	A. lateral-line pores on anterior third of body B. 6 infraorbital, 3 supraorbital, 7 pre-operculomandibular pores	lateral-line pores nearly to caudal base 5, 3, and 7, respectively
Vertebrae number	165–170	200
Dorsal fin origin	above basal third of pectoral fin	$\frac{3}{5}$ pectoral fin posterior to base of pectoral fin
Location of anus and anal fin	far forward, less than one head length posterior to gill slit; anal fin origin immediately posterior to anus	far forward, about $\frac{3}{5}$ head length posterior to gill slit; anal fin origin shortly posterior to anus
Caudal fin	continuous with dorsal and anal fins	same as <i>M. abyssalis</i>
Pectoral fin	broad-based, ovate, slightly less than snout length; 28–30% of head length	broad, posterodorsal to gill slit; about the length of snout, 24.2% of head length
Coloration	all fins are pale, although darker at their base; body color brown	dorsal and anal fins grey, but posteriorly dark brown; caudal fin dark brown; pectoral fin light brown; body color dark brown when fresh, light brown after formalin preservation
Dentition	most teeth are large canines; about 12 teeth in an irregular patch on the premaxillary-ethmoid complex; the vomerine teeth are irregular biserial anteriorly and gradually become irregularly uniserial; maxillary teeth numerous, roughly triserial anteriorly, irregular posteriorly; large dentary teeth biserial for almost the entire length of the jaw	6 teeth on premaxillary-ethmoid complex; vomerine teeth in three rows of which the middle row has 4 large conical teeth, at each side of this middle row a row of about 5 or 6 smaller teeth; maxillary teeth small, numerous in teeth band; conical teeth about the size of vomerine teeth of lateral row distributed evenly in lower jaw

Robins, 1970; 1976). The present specimen shares more characters with *Meadia* than with other genera (i.e., teeth not compound and not in single row; anus far forward, e.g., less than one head-length posterior to gill slits) and is easily differentiated from *M. abyssalis* (Table 3).

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LITERATURE CITED

- Chen, J. T. F. and H. T. C. Weng. 1967. A review of the apodal fishes of Taiwan. Biol. Bull. 32: 1–86. Tunghai University, Taiwan.
- Masuda, H., K. Amaoka, C. Araga, T. Uyeno, T. Yoshino and K. M. Muzik. 1984. The fishes of the Japanese Archipelago. Tokai University Press. 437 pp.
- Robins, C. H. and C. R. Robins. 1970. The eel family Dysommidae (including the Dysomminidae and Nettodaridae), its osteology and composition, including a new genus and species. Proc. Acad. Nat. Sci. Phila. 122(6): 293–335.
- and ———. 1976. New genera and species of dysommine and synaphobranchine eels (Synaphobranchidae) with an analysis of the Dysomminae. Proc. Acad. Nat. Sci. Phila. 127(8): 249–280.
- and ———. 1989. Family Synaphobranchidae. In E. B. Bohlke, ed. Fishes of the western North Atlantic—part nine. Anguilliformes, Saccopharyngiformes, and Leptocephali. Sears Foundation for Marine Research, Memoir 1 (Part 9): 207–253.
- Saldanha, L. and N. R. Merrett. 1982. A new species of the deep-sea eel genus *Ilyophis* Gilbert (Synaphobranchidae) from the North Atlantic with comments on its ecology and intrafamilial relationships. J. Fish. Biol. 21: 623–636.

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